Equating the values of $c$ as given in (11) and (12),

$$\left(\frac{4x^2(3x-1)-2x(9x-1)(x+1)}{(9x+1)(x+1)}\right)\frac{d^2y}{dx^2}+\frac{dy}{dx}-\frac{y}{x+1}=0\ldots\ldots(13).$$

$$\therefore\ 2x(3x^2+10x-1)\frac{d^2y}{dx^2}-(9x+1)(x+1)\frac{dy}{dx}+(9x+1)y=0,$$

which is the Differential Equation given by the Praposer of the problem.

*Scholium.*—The proposed Differential Equation is satisfied by the equations, $y=1+x\ldots\ldots(\alpha)$ and $y=2x^{\frac{1}{2}}(3x-1\ldots\ldots(\beta)$; that is, these equations are particular solutions, or *particular integrals*, of the Differential Equation.

**36. Proposed by H. C. WHITAKER, B. Sc., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.**

A cube is revolved on its diagonal as an axis. Define the figure described and calculate its volume.

**II. Solution by the PROPOSER.**

The edges adjacent to the axis of revolution generate cones; the two edges not adjacent to the axis generate a hyperboloid of one nappe. Take the axis of revolution as the axis of $z$. The equation of the cones is $x^2+y^2=2(z\pm\frac{1}{2}\sqrt{3}a)^2$, the altitude of each being $\frac{1}{3}\sqrt{3}a$, the radius of each being $\frac{1}{3}\sqrt{6}a$, the volume of each being $\frac{2\pi\sqrt{3}}{27}a^3$.

The equation of the hyperboloid is $2x^2+2y^2-4z^2=a^2$, the volume being the integral of $\pi(2z^2+\frac{a^2}{2})dz$ between the limits $\frac{1}{6}a\sqrt{3}$ and $-\frac{1}{6}a\sqrt{3}$, this volume being $\frac{5\pi\sqrt{3}}{27}a^3$. Adding the volume of the hyperboloid to the volume of the two cones, the total volume is found to be $\frac{\pi}{\sqrt{3}}a^3=1.8138a^3$.

[This solution is given for comparison with that of *DR. ZERR*, published in last issue. EDITOR.]

**38. Proposed by L. B. FILLMAN, St. Petersburg, Pennsylvania.**

The diameter of the circular base of a dome is $10=a$ feet, which is also the distance from any point on the circumference of the base to any point on the opposite side of the dome from base to apex. Find the volume of the dome.

**I. Solution by GEORGE B. McCLELLAN ZERR, M. A., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas; and the PROPOSER.**

Let $x^2+y^2=a^2$ be the equation to the circle that forms a section of the dome perpendicular to the base. Then any section parallel to the base at dis-